LEC

WETLANDS WILDLIFE WATERWAYS

Essential Fish Habitat Assessment

July 6, 2012

Project:
MassDOT Mitchell River Bridge Replacement Project
Chatham, Massachusetts

Prepared For:
Mr. Paul Bergquist
URS Corporation
260 Franklin Street, Suite 300
Boston, MA 02110-3197

LEC Environmental Consultants, Inc.

12 Resnik Road
Suite 1
Plymouth, MA 02360
508-746-9491
508-746-9492 fax

www.lecenvironmental.com

1.0 Introduction

As requested, LEC Environmental Consultants, Inc., (LEC) in conjunction with Saquish Scientific, LLC, has prepared this assessment of the Essential Fish Habitat (EFH) for the proposed reconstruction of the Mitchell River Bridge spanning Mitchell River (Figure 1), in the town of Chatham, Massachusetts by the Massachusetts Department of Transportation (MassDOT). According to the National Marine Fisheries Service (NOAA Fisheries), EFH has been designated for 17 federally managed species (detailed in Section 3.0 below) within the vicinity of the proposed work area. In addition, the Massachusetts Division of Marine Fisheries (DMF) has identified the project site to be within winter flounder (*Pleuronectes americanus)* spawning habitat and has provided mitigation recommendations and considerations (Appendix A) which have been incorporated into the construction methodology for the project. This assessment addresses EFH that has been classified by NOAA Fisheries within the Mitchell River and Stage Harbor system in the context of two bridge design alternatives.

EFH is defined as *those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity* [16 U.S.C. 1802(10)]. To clarify, the term "waters" *include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate* (50 CFR 600.10); "substrate" *includes sediment, hard bottom, structures underlying the waters, and associated biological communities* (50 CFR 600.10); and "necessary" *means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem* (50 CFR 600.10).

LEC has reviewed pertinent materials regarding the species cited in the EFH designations and coupled this information with recently collected field data and site evaluations to formulate a thorough Assessment. A summary of the EFH designations in the vicinity of the bridge, existing site conditions, proposed construction and bridge alternatives, and an evaluation of potential adverse effects to EFH are included below.

2.0 Project Description

The Mitchell River Bridge has been identified as structurally deficient by the Massachusetts Department of Transportation (MassDOT). As part of the State's ongoing efforts to improve bridge safety throughout the Commonwealth, the bridge has been placed within the Accelerated Bridge Program. The existing bridge, which features one travel lane in each direction, is approximately 192 feet long, 37'-5" out to out width, and consists of a twelve span timber trestle structure including a single-leaf timber bascule type lift span. The bridge (C-07-001) and surrounding areas are shown on Figure 1. MassDOT and their engineering consultant, URS Corporation are continuing to work with the Town of Chatham to facilitate the design and construction of a "context sensitive" replacement bridge. Two construction alternatives that incorporate appropriate historic design considerations have been produced and are described in detail in Section 5 below.

3.0 EFH Designation

According to the NOAA Fisheries Essential Fish Habitat Designation for the region (http://www.nero.noaa.gov/hcd/STATES4/CapecodtoNH/41306950.html) the site occurs within designated EFH for seventeen (17) species as shown in Figure 8. A summary of the habitat designations for these species follows and is based upon the Guide to Essential Fish Habitat Designations in the Northeastern United States[1].

3.1 Little Skate (*Leucoraja erinacea*)

The NMFS has determined that little skate is not in an overfished condition and that overfishing of this stock is not occurring, based on stock size assessment. For little skate, EFH requires bottom habitats with a sandy substrate from Georges Bank through to Southern New England to the Middle Atlantic Bight. Generally, little skate eggs are found at depths less than 27 meters and temperatures greater than 7 °C. The EFH Source Document for little skate does identify the sediment type, depth, and temperature where little skate eggs are found. However, there is no map to accompany this designation because all of the EFH maps for the skate species are based on NMFS survey data, and there are no survey data for skate eggs. Therefore, only a text definition is provided for little skate eggs. No larval life stage exists for this species. Upon hatching, they are fully developed juveniles (ELMR Report Number 12, March 1994[2]). Juveniles and adults prefer habitats with a sandy or gravelly substrate or mud at depths from the shore to 137 meters, with the highest abundance from 73-91 meters. Most juveniles are found between 4-15°C and adults between 2-15°C.

3.2 Winter Skate (*Leucoraja ocellata*)

NMFS has determined that winter skate is in an overfished condition and that overfishing of this stock is occurring, based on stock size assessment. There is no information available on the habitat associations or distribution of the egg stage for this species. No larval life stage exists for this species. Upon hatching, they are fully developed juveniles (ELMR Report Number 12, March 1994). Juveniles and adults prefer bottom habitats with a substrate of sand and gravel or mud in Cape Cod Bay, on Georges Bank, the southern New England shelf, and through the Mid-Atlantic Bight to North Carolina. Winter skate juveniles are generally found at depths ranging from shoreline to about 400 meters and most abundant at depths less than 111 meters. Juveniles are found within temperatures that range from -1.2°C to around 21°C, with most found from 4-16 °C, depending on the season. Winter skate adults are generally found in depths that range from shoreline to 371 meters (most abundant at depths 111 meters) and temperatures that range from – 1.2 °C to around 20 °C, with most found from 5-15 °C, depending on the season.

[1] http://www.nero.noaa.gov/hcd/webintro.html.
[2] Stone, S.L., et al. 1994. Distribution and abundance of fishes and invertebrates in Mid-Atlantic estuaries. ELMR Rep. No. 12. NOAA/NOS SEA Division, Silver Spring, MD. 280 p.

3.3 Atlantic Bluefin Tuna (*Thunnus thynnus*)

Although the EFH mapper indicates that the Mitchell River is within EFH for "all" life stages (eggs, juvenile, adult) of bluefin tuna, the prevailing assumption is that spawning and larval recruitment occurs primarily in the Gulf of Mexico, Bahamas, and in the Florida Straits. Juveniles migrate from these spawning areas to nursery areas located between Cape Hatteras, North Carolina and Cape Cod, Massachusetts. The habitat requirements for larval success are not known, but larvae are collected within narrow ranges of temperature and salinity - approximately 26°C and 36 ppt. Along the coast of the southeastern United States onshore meanders of the Gulf Stream can produce upwelling of nutrient rich water along the shelf edge. In addition, compression of the isotherms on the edge of the Gulf Stream can form a stable region which, together with upwelling nutrients, provides an area favorable to maximum growth and retention of food for the larvae. Adults live in pelagic waters of the central Gulf of Mexico and the mideast coast of Florida, North Carolina from Cape Lookout to Cape Hatteras, and New England from Connecticut to the mid-coast of Maine.

3.4 Smooth Dogfish (*Mustelus canis*)

Smooth dogfish is a common coastal shark species found in the Atlantic Ocean from Massachusetts to northern Argentina. They are primarily demersal sharks that inhabit continental shelves and are typically found in inshore waters down to 200 m depth. Smooth dogfish is a migratory species that responds to changes in water temperature. They primarily congregate between southern North Carolina and the Chesapeake Bay in the winter. In the spring, smooth dogfish move along the coast when bottom water warms up to at least 6 to 21°C. As temperatures get colder, smooth dogfish move offshore to their wintering areas. Smooth dogfish have diets that are dominated by invertebrates. They primarily feed on large crustaceans, consisting mostly of crabs, but also rely heavily on American lobsters. In the New England waters during the spring, smooth dogfish feed on small bony fish, including menhaden, stickleback, wrasses, porgies, sculpins, and puffers. Female smooth dogfish have an 11–12 month gestation period with mating occurring between May and September. Marsh creeks may be particularly important to newborn smooth dogfish during June and July. Young-of-year (YOY) pups grow rapidly in these areas to a size of 55-70 cm TL, prior to migration from the estuaries by the end of October. The abundance of YOY within estuaries strongly suggests that estuaries are critically important nursery habitats for smooth dogfish within the Mid-Atlantic Bight between North Carolina and Massachusetts.

3.5 Winter Flounder (*Pleuronectes americana*)

According to the EFH mapping tool, winter flounder habitat is limited to the open waters of Nantucket Sound and not within the Stage Harbor system. However, the estuary is considered winter flounder habitat by the DMF as stated in a letter dated September 10, 2009 (P. Diodati). Therefore, the EFH for this species will be described and considered as part of this assessment.

Winter flounder eggs require bottom habitats with a substrate of sand, muddy sand, and mud. Generally, this habitat is characterized by water temperatures of less than 10°C, salinity ranging

from 10-30 ppt. and water depths less than 5m. Eggs are typically observed from February to June. Larvae are commonly observed from March through July. Juveniles (young of the year/age 1+, respectively) occur in bottom habitats with mud or fine-grained sediments where water temperatures are below 28°C/25°C, salinity between 5-33 ppt/10-30 ppt, and depths range from 0.1 to 10 m/1-50 m. Adult winter flounder occupy bottom habitats similar to age 1+ juveniles, including estuaries with mud, sand, or muddy sand at similar temperature ranges and depths, but in water with salinity ranging from 10-30 ppt. However, spawning adults are found in estuarine and near coastal waters where water temperatures are below 15°C, at depths of less than 6 m and salinity ranging from 5.5-36 ppt. Spawning is most commonly observed during the months of February through June.

3.6 Atlantic Cod (*Gadus morhua*)

According to the EFH Designation, adult Atlantic cod habitat is present in the vicinity of the project site. According to the EFH Description for Atlantic cod, adults prefer "bottom habitats with a substrate of rocks, pebble and gravel in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay. They prefer water temperatures below 10°C, depths between 10 m and 150 m, and a wide range of ocean salinities.

3.7 Haddock (*Melangogrammus aeglefinus*)

According to the EFH Designation, adult haddock habitat is present in the vicinity of the project site. According to the EFH Description for adult haddock, the fish prefer "bottom habitats with a substrate of broken ground, pebbles, smooth hard sand and smooth areas between rocky patches on Georges Bank and the eastern side of Nantucket Shoals, and throughout the Gulf of Maine, plus additional area of Nantucket Shoals and the Great South Channel. Adult haddock prefer water temperatures below 7°C, depths between 40 m and 150 m, and salinity between 31.5‰ to 35‰.

3.8 Atlantic Halibut (*Hippoglossus hippoglossus*)

According to the EFH Designation, habitat for all life stages of Atlantic halibut is present in the vicinity of the site. According to the EFH Description for haddock, eggs are found in pelagic waters to the sea floor of the Gulf of Maine and Georges Bank in water temperatures between 4 and 7°C, depths less than 700 m and salinities less than 35‰. Larvae are found in surface waters of the Gulf of Maine and Georges Bank in water with salinities between 30‰ to 35‰. Juveniles and adults prefer bottom habitats with a substrate of sand, gravel or clay in the Gulf of Maine and Georges Bank. Juveniles are found in water temperatures above 2°C and depths from 20-60 m. Adults are found in water temperatures below 13.6°C, depths from 100-0700 m, and salinities between 30.4‰ and 35.3‰.

3.9 Long Finned Squid (*Loligo pealeii*)

According to the EFH Designation, EFH for long finned squid adults and juveniles exists in the vicinity of the project site. According to the EFH Description, habitat for the pre-recruits is the pelagic waters over the continental shelf from the Gulf of Maine to Cape Hatteras, North

Carolina. Generally long fin squid pre-recruits are collected from shore to 700 m in water temperatures between 39°F and 81°F. Long fin squid recruits are collected from shore to 1000 ft in water temperatures between 39°F and 81°F.

3.10 Short Finned Squid (*Illex illecebrosus*)

According to the EFH Designation, EFH for short finned squid adults and juveniles is present in the vicinity of the project site. According to the EFH Description, habitat for pre-recruits is the pelagic waters over the continental shelf from the Gulf of Maine to Cape Hatteras, North Carolina. Generally short fin squid pre-recruits are collected from shore to 600 ft in water temperatures between 36°F and 73°F. Short fin squid recruits are collected from shore to 600 ft in water temperatures between 39°F and 66°F.

3.11 Atlantic Butterfish (*Peprilus triacanthus*)

According to the EFH Designation, Atlantic butterfish habitat for all life stages is present in the vicinity of the project site. According to the EFH Description, generally, butterfish eggs are collected from shore to 6000 ft and temperatures between 52°F and 63°F.

Similarly, larvae, juveniles and adults are found in offshore waters over the Continental Shelf from the Gulf of Maine through Cape Hatteras, North Carolina areas, and inshore where EFH includes estuaries on the Atlantic coast from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish larvae are collected in depths between 33 ft and 6000 ft and temperatures between 48°F and 66°F, juveniles in depths between 33 ft and 1200 ft and temperatures between 37°F and 82°F, and adults in depths between 33 ft and 1200 ft and temperatures between 37°F and 82°F.

3.12 Atlantic Mackerel (*Scomber scombrus*)

According to the EFH Designation, Atlantic mackerel habitat is present for all life stages in the vicinity of the project site. According to the EFH Description, mackerel eggs, larvae, juveniles and adults are found offshore in the pelagic waters found over the Continental Shelf from Maine through Cape Hatteras, North Carolina, and inshore EFH includes estuaries on the Atlantic coast from Passamaquoddy Bay, Maine to James River, Virginia.

Generally, Atlantic mackerel eggs are collected from shore to 50 ft and temperatures between 41°F and 73°F; larvae are collected in depths between 33 ft and 425 ft and temperatures between 43°F and 72°F; juvenile Atlantic mackerel are collected from shore to 1050 ft and temperatures between 39°F and 72°F; and adult Atlantic mackerel are collected from shore to 1250 ft and temperatures between 39°F and 61°F.

3.13 Summer Flounder (*Paralichthys dentatus*)

According to the EFH Designation, summer flounder habitat for all life stages is present in the vicinity of the project site. According to the EFH Description for summer flounder eggs, North of Cape Hatteras, EFH is the pelagic waters found over the Continental Shelf, from the Gulf of Maine to Cape Hatteras, North Carolina. In general, summer flounder eggs are found between

October and May, being most abundant between Cape Cod and Cape Hatteras, with the heaviest concentrations within 9 miles of shore off New Jersey and New York. Eggs are most commonly collected at depths of 30 to 360 ft.

North of Cape Hatteras, EFH for summer flounder larvae is the pelagic waters found over the Continental Shelf from the Gulf of Maine to Cape Hatteras, North Carolina. In general, summer flounder larvae are most abundant nearshore (12-50 miles from shore) at depths of 30 to 230 ft. They are most frequently found in the northern part of the Mid-Atlantic Bight from September to February, and in the southern part from November to May.

North of Cape Hatteras, EFH for summer flounder juveniles is the demersal waters over the Continental Shelf from the Gulf of Maine to Cape Hatteras, North Carolina. In general, juveniles use several estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas in water temperatures greater than 37°F and salinities from 10 to 30 ppt range.

North of Cape Hatteras, EFH for adult summer flounder is the demersal waters over the Continental Shelf from the Gulf of Maine to Cape Hatteras, North Carolina. Generally summer flounder inhabit shallow coastal and estuarine waters during warmer months and move offshore on the outer Continental Shelf at depths of 500 ft in colder months.

3.14 Scup (*Stenotomus chrysops*)

According to the EFH Designation, scup habitat for adults and juveniles is present in the vicinity of the project site. According to the EFH Description, juvenile and adult scup, in general during the summer and spring are found in estuaries and bays between Virginia and Massachusetts, in association with various sands, mud, mussel and eelgrass bed type substrates and in water temperatures greater than 45°F and salinities greater than 15 ppt.

3.15 Black Sea Bass (*Centropristis striata*)

According to the EFH Designation, black sea bass habitat for larvae, juveniles and adults exists in the vicinity of the project site. According to the EFH Description, EFH for black sea bass larvae is the pelagic waters found over the Continental Shelf and estuaries from the Gulf of Maine to Cape Hatteras, North Carolina. Generally, the habitats for the transforming (to juveniles) larvae are near the coastal areas and into marine parts of estuaries between Virginia and New York. When larvae become demersal, they are generally found on structured inshore habitat such as sponge beds.

Juveniles are found in the estuaries in the summer and spring. Generally, juvenile black sea bass are found in waters warmer than 43°F with salinities greater than 18 ppt and coastal areas between Virginia and Massachusetts, but winter offshore from New Jersey and south. Juvenile black sea bass are usually found in association with rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas; offshore clam beds and shell patches may also be used during the wintering. Black sea bass are generally found in estuaries from May through October. Wintering adults (November through April) are generally offshore, south of New York

to North Carolina. Temperatures above 43°F seem to be the minimum requirements. Structured habitats (natural and man-made), sand and shell are usually the substrate preference.

3.16 Surf Clam (*Spisula solidissima*)

According to the EFH Designation, surf clam habitat for juveniles and adults exists in the vicinity of the project site. According to the EFH Description, surf clam habitat exists throughout the substrate, to a depth of three feet below the water/sediment interface, within federal waters from the eastern edge of Georges Bank and the Gulf of Maine. Surf clams generally occur from the beach zone to a depth of about 200 feet, but beyond about 125 feet abundance is low.

3.17 Blue Shark (*Thunnus thynnus*)

According to the EFH Designation, blue shark habitat for adults is present in the vicinity of the project site. The blue shark is oceanic and epipelagic. In temperate seas, it occasionally approaches shore. It is found worldwide in tropical and temperate waters.

4.0 Existing Conditions

4.1 Resource Areas

Presently, the Mitchell River provides habitat for a host of marine organisms including a variety of shellfish and finfish. In addition to the estuarine waters of the Mitchell River, salt marsh and bordering freshwater (upland) plant communities are present and serve as wildlife habitat. While not the focus of the study, intertidal and bordering habitat observations were also made. Our site inspection confirmed the presence of salt marsh (primarily low marsh) within the immediate project area as well as evidence of shellfish beds adjacent to and within the footprint of the existing bridge. Direct inspection of the marine bottom within the proposed construction footprint confirmed that eelgrass is *not* present in these locations. However, the western side of the site is within a zone of historical eelgrass. Commercial/managed shellfish species are present, most notably hardshell clam (*Mercenaria mercenaria*) (Section 4.2), as well as potential suitable habitat for several managed finfisheries (Section 4.4).

4.2 Sediment and Sea Floor Observations

Sediment conditions were observed on September 13, 2011. Sediment characteristics included firm silty, sand mixed with shell hash and gravel along the eastern and western banks of the river. Similar conditions were observed in the central, deeper areas of the estuary in the vicinity of the bridge. All sediments contained shell fragments at the surface and in some areas the algae dead man's fingers (*Codium fragile)* was observed attached to large shells and rocks. Shell debris was comprised primarily of hardshell clams.

4.3 Water Quality Parameters

The Massachusetts Department of Environmental Protection (MADEP) conducted an assessment of water quality in the Stage Harbor system (including Mitchell River) as part of the

Massachusetts Estuary Project[3]. This project focused on the sources and fate of nitrogen with respect to ecosystem thresholds associated with nutrient over-enrichment. During the MADEP assessment, field observations of water quality, hydrodynamics, and ecological attributes were made to support numerical modeling of nitrogen dynamics.

According to the MADEP assessment, the mean depth of the Mitchell River is approximately 1.5 meters. Mean salinity is 30 ppt. The tide within the Stage Harbor system is semidiurnal and at the Mitchell River Bridge the amplitude ranges from between 2.2 feet and 6.0 feet (neap and spring, respectively). The local water residence time at the Mitchell River Bridge is approximately 1.0 day. The mean total nitrogen concentration measured in the vicinity of the bridge is 0.43 mg/L which is, as expected, higher than the mean Nantucket Sound concentration of 0.29 mg/L.

Within the Stage Harbor System, only Mill Pond showed very low oxygen levels (<3 mg/L). Oyster Pond and lower Mitchell River consistently had oxygen levels >5 mg/L and chlorophyll *a* levels < 15 ug/L (generally <10 ug/L). None of these systems showed very high bloom conditions. However, both parameters clearly indicate nutrient enrichment in Mill Pond and to a lesser extent in Oyster Pond and lower Mitchell River.

The 1951 eelgrass distribution maps for the Stage Harbor system suggest that eelgrass coverage was significantly greater in some of the sub-embayments compared to present conditions. The system still had coverage in 1994 and the near complete loss by 2000. In fact, it appears that the Stage Harbor system was capable of supporting relatively dense eelgrass stands in 1951.

Based on our review of the MADEP assessment of Stage Harbor and our benthic infaunal analysis in the vicinity of the existing bridge, we conclude that the area around the Mitchell River Bridge is relatively healthy, exhibits only moderate levels of stress, and generally contains intermediate to high values of habitat quality and diversity.

5.0 Proposed Bridge Structure Alternatives

Two bridge design alternatives are being considered for this project: (1) all timber replacement with concrete bascule pier (Figure 2) and (2) timber superstructure on concrete and steel substructure (Figure 3) with concrete bascule pier. It is important to note that regardless of the bridge design alternative selected, three aspects of construction will not change: (1) the existing wood piles will be removed (extracted) and (2) the proposed concrete bascule pier will permanently occupy 1,325 square feet of Land Under Water, and (3) existing rip-rap located adjacent to the east and west abutments will be replaced in approximately the same footprint as currently exists.

The important distinctions between the two alternatives for the purpose of this analysis is: the materials (one has timber substructure, one has steel and concrete substructure), the total number of piles (128 for the timber structure and 41 for the steel and concrete alternative), and the

[3] http://www.oceanscience.net/estuaries/Chatham.htm.

expected lifespan of the materials (20-30 years for the timber structure and 70-75 years for the steel and concrete alternative).

5.1 All Timber Replacement with Elevated Concrete Bascule Pier

This alternative generally consists of an all timber superstructure (i.e., timber wearing surface, structural deck, beams, diaphragms, traffic railings, pedestrian railings, and lifting beam) supported on an all timber substructure (i.e., timber piles, bent caps, bracing, sheave poles, and fender system) that closely resembles the existing bridge, but is modified to include improvements. The proposed all-timber bascule leaf is supported on a reinforced concrete bascule pier that includes concrete walls that fully enclose the pier.

This alternative consists of a 194'-0" long twelve-span bridge (40'-11" out to out width) with a single-leaf bascule span over a navigation channel matching the location and width of the existing channel. The span arrangement is similar to the existing bridge and consists of five (5) 16'-0" west approach spans, one (1) 8'-8" flanking span (i.e. span west of the bascule span), one (1) 16'-2" long bascule pier, one (1) 27'-2" bascule span (25'-0" navigational clearance), and four (4) 16'-0" east approach spans, measured from center of pile bents or face of abutment back walls. The all timber replacement option includes 12 spans and approximately 128 pilings expected to last 20-30 years before needing to be replaced.

5.2 Timber Superstructure on Concrete and Steel Substructure

The proposed approach spans for this alternative generally consist of an all timber superstructure (i.e., timber wearing surface, structural deck, beams, diaphragms, sidewalks, traffic railings, and pedestrian railings) supported on pile bent substructure units constructed with steel piles and concrete caps. The bascule span superstructure generally consists of a timber roadway deck and sidewalks on steel framing supported on concrete bascule pier substructure. The anticipated lifespan of the concrete and steel alternative is 75 years.

This alternative consists of a 195'-0" long six-span bridge (40'-11" out to out width) with a single-leaf bascule span over a wider navigation channel than the existing channel. The span arrangement consists of two (2) 30'-0" west approach spans, one (1) 25'-9" flanking span (immediately west of the bascule span), one (1) 49'-3" bascule span including bascule pier and bascule leaves (25'-0" navigational clearance), and two (2) 30'-0" east approach spans, measured from center of pile bents or face of bascule pier or abutment back walls. The concrete and steel substructure alternative includes 6 spans.

5.3 Construction Methodology and Mitigation

The construction approach includes specific mitigation measures designed to prevent adverse impacts to the sensitive marine environment. DMF has requested a time-of-year prohibition on all in-water uncontained silt-producing activities between January 15 and May 31 to protect winter flounder habitat. DMF also requested limited obstruction to tidal flow during construction to no more than 25% of the total hydraulic opening, and to avoid placement of new foundations and other structures within eelgrass beds (as stated above, eelgrass is not present within the

construction footprint). The recommendations of DMF have been incorporated into the construction methodology. The contractor will be instructed to limit obstruction to no more than 25% of the hydraulic opening.

Prior to construction, a combination of hay-bales and silt fences will be placed along the perimeter of the upland work areas to control sedimentation. Turbidity barriers will be placed around the existing pile bents during pile removal and around new pile bents during installation of new piles to contain sediments produced during construction activities. The turbidity barrier shall consist of a floating silt curtain anchored at required locations with length provisions for high tide conditions. The geo-textile fabric of the silt curtain extends from the surface to the river bottom and stops sediments from moving through the barrier into the water column. Steel sheet pile cofferdams will be used for demolition of the existing abutments and for construction of the new bascule pier and abutments. Turbidity barriers will be placed around the steel sheet piling during installation and once the steel sheet piling has been installed, the turbidity barriers may be removed, as the sheet piling will adequately contain sediments produced by construction activities performed within the cofferdams. The cofferdams will be dewatered in order to permit demolition and construction operations in the dry. Water that is removed from the cofferdams during dewatering operations will be collected and filtered to remove sediments before discharge back into the waterway.

Direct communication may occur between MassDOT and DMF prior to construction to confirm that certain construction activities may be performed in water during the time-of-year prohibition, and to define additional mitigation measures, if any, that must be used during the time-of-year prohibition to minimize the adverse effects of silt-producing activities.

6.0 Analysis of Effect to the EFH

The proposed construction activities are relatively limited in scope; however, potential impacts to EFH may result. These impacts include both temporary and permanent impacts, some of which have the potential to affect the life stages of select EFH managed species. The permanent impacts are associated with the loss of marine habitat due to the installation of the piles and concrete bascule pier, and potential direct adverse effects to EFH from silt-producing activity during construction.

The potential permanent loss of marine habitat is relatively minor in the context of the overall amount of similar marine habitat present in the vicinity of the bridge and within the Stage Harbor/Mitchell River system. This loss of habitat is expected to have a de minimus impact on EFH if the construction methodology and mitigation are followed. The concrete and steel alternative requires replacement every 75 years, so potential impacts during construction will be minimized over the long-term when compared to the all-timber structure requirements for replacement of 128 piles every 20-30 years. In addition, the total number of pilings associated with the all timber alternative would increase the duration of in-water work related to installation when compared to the steel and concrete alternative.

The potential impacts associated with construction for each species are described below.

6.1 Little Skate (*Leucoraja erinacea*)

Since little skate eggs are found at depths less than 27 m and temperatures greater than 7°C; therefore, project activities may affect EFH during non-winter months. However, juveniles and adults may occupy the Mitchell River area throughout the fall, winter, and spring seasons. This species is not considered to be overfished so the relative sensitivity to adverse conditions on the overall population should be low with regard to the proposed bridge reconstruction. Potential direct impacts to little skate eggs, juveniles and adults may occur during construction if eggs or individuals are present in the work footprint. The presence of the concrete bascule pier will eliminate a small potentially suitable habitat area with no significant adverse impact to the species expected.

6.2 Winter Skate (*Leucoraja ocellata*)

NMFS has determined that winter skate is in an overfished condition and that overfishing of this stock is occurring, based on stock size assessment. Juveniles are found within temperatures that range from -1.2°C to around 21°C, with most found from 4-16°C, depending on the season. Winter skate adults are generally found in depths that range from shoreline to 371 m (most abundant at depths 111 meters) and temperatures that range from –1.2°C to around 20°C, with most found from 5-15°C, depending on the season. Therefore, adult and juvenile winter skates may be present in the Mitchell River system throughout most of the year, potentially spanning all seasons. Potential direct impacts to eggs, juveniles and adults may occur during construction if present in the work footprint. The presence of the concrete bascule pier will eliminate a small potentially suitable habitat area with no significant adverse impact to the species expected.

6.3 Atlantic Bluefin Tuna (*Thunnus thynnus*)

Atlantic bluefin tuna typically spawn in subtropical waters (e.g., Gulf of Mexico) during spring months so the presence of eggs and larvae in the Mitchell River system is highly unlikely. However juveniles and young adults may utilize habitat in the Mitchell River, though this has not been documented. If so, they would likely be present during warmer months (spring through fall) and not present during winter months. Adult bluefin tuna (>230 cm) are typically found in deeper, pelagic areas east of Nauset beach from May through December. It is unlikely that bluefin tuna will be impacted by the construction activities as eggs and larvae are not likely to be present. Juveniles and young adults would likely avoid barriers or other activity within the construction footprint, utilizing the hydraulic opening (at least 75% of total to remain open) that will be maintained during construction.

6.4 Smooth Dogfish (*Mustelus canis*)

Smooth dogfish tend to congregate between southern North Carolina and the Chesapeake Bay in the winter. In the spring they move along the coast when bottom water warms up to at least 6 to 2°C. As temperatures get colder, smooth dogfish move offshore to their wintering areas. Therefore, this species could be present in the Mitchell River system from spring to fall. They do not release eggs so reproductive use of the habitat is limited to copulation activities. Potential

direct impacts to juveniles and adults may occur during construction if present in the work footprint; however, individuals are likely to avoid impacts by utilizing the hydraulic opening.

6.5 Winter Flounder (*Pleuronectes americana*)

According to DMF the project site contains suitable habitat for all life stages of winter flounder. The varied marine bottom types of this estuarine system (muds, sands and gravel), combined with water temperature, depth and salinity are ideal for juveniles and adults in warmer months, and equally suitable for eggs and larvae in colder months. The project will affect suitable habitat through the loss of habitat associated with the concrete bascule pier, as described above. The project may also result in direct impacts to this managed species if silt comes into contact with eggs or larvae during construction. As described above, the project involves TOY restrictions and turbidity barriers to prevent impacts from siltation.

6.6 Atlantic Cod (*Gadus morhua*)

Adult Atlantic cod are unlikely to frequent the Mitchell River in the vicinity of the project site due to the relative shallow waters and warmer water temperatures. Adult Atlantic cod would likely avoid barriers or other activity within the construction footprint, utilizing the hydraulic opening (at least 75% of total to remain open) that will be maintained during construction. No significant adverse impact to the species expected.

6.7 Haddock (*Melangogrammus aeglefinus*)

Adult haddock are unlikely to frequent the Mitchell River in the vicinity of the project site due to the relative shallow waters and warmer water temperatures. Adult haddock would likely avoid barriers or other activity within the construction footprint, utilizing the hydraulic opening (at least 75% of total to remain open) that will be maintained during construction. No significant adverse impact to the species expected.

6.8 Atlantic Halibut (*Hippoglossus hippoglossus*)

Atlantic halibut are unlikely to frequent the Mitchell River in the vicinity of the project site due to the relative shallow waters and warmer water temperatures. No significant adverse impact to the species expected.

6.9 Long Finned Squid (*Loligo pealeii*)

Long finned squid are unlikely to frequent the Mitchell River in the vicinity of the project site due to the relative shallow waters and warmer water temperatures. No significant adverse impact to the species expected.

6.10 Short Finned Squid (*Illex ilecebrosus*)

Short finned squid are unlikely to frequent the Mitchell River in the vicinity of the project site due to the relative shallow waters and warmer water temperatures. No significant adverse impact to the species expected.

6.11 Atlantic Butterfish (*Peprilus triacanthus*)

Atlantic Butterfish spawn from May through August which is outside of the winter flounder protective period (January through April). Eggs are found in a range of depths, including shallow, inshore areas. Thus, suitable egg habitat could be affected by the project. Since the reproductive range of this species occurs from Cape Hatteras to Nova Scotia, and the majority of larvae have been observed in deep, offshore water, the scale of this project will not have a significant impact.

6.12 Atlantic Mackerel (*Scomber scombrus*)

Atlantic mackerel EFH is limited to offshore pelagic waters. This project will have negligible impact on this species.

6.13 Summer Flounder (*Paralichthys dentatus*)

Juvenile and adult summer flounder may be found in the vicinity of the project site and therefore may be impacted. The project will affect suitable habitat through the loss of habitat associated with the concrete bascule pier, as described above. The project may also result in direct impacts to this species if present in the work footprint during construction; however the relatively small work footprint and scope of work is unlikely to result in any significant adverse impact to this species.

6.14 Scup (*Stenotomus chrysops*)

EFH for scup eggs, larvae, juveniles, and adults include New England estuarine waters. Spawning occurs between May and August in salinities greater than 15 ppt. The project will affect suitable habitat through the loss of habitat associated with the concrete bascule pier, as described above. The project may also result in direct impacts to this species if present in the work footprint during construction; however the relatively small work footprint and scope of work is unlikely to result in any significant adverse impact to this species.

6.15 Black Sea Bass (*Centropristis striata*)

All life stages of Black sea bass have been documented in New England estuarine waters. This species is attracted to structure, including bridge supports, especially during the larval stage. The project may affect suitable habitat through the loss or disruption of habitat associated with the concrete bascule pier, as described above. The project may also result in direct impacts to this species if present in the work footprint during construction; however the relatively small work footprint and scope of work is unlikely to result in any significant adverse impact to this species.

6.16 Surf Clam (*Spisula solidissima*)

Since surf clams generally occur from the beach zone to a depth of about 200 feet, they are unlikely to occur in the vicinity of the project site. No adverse effect to this species is anticipated.

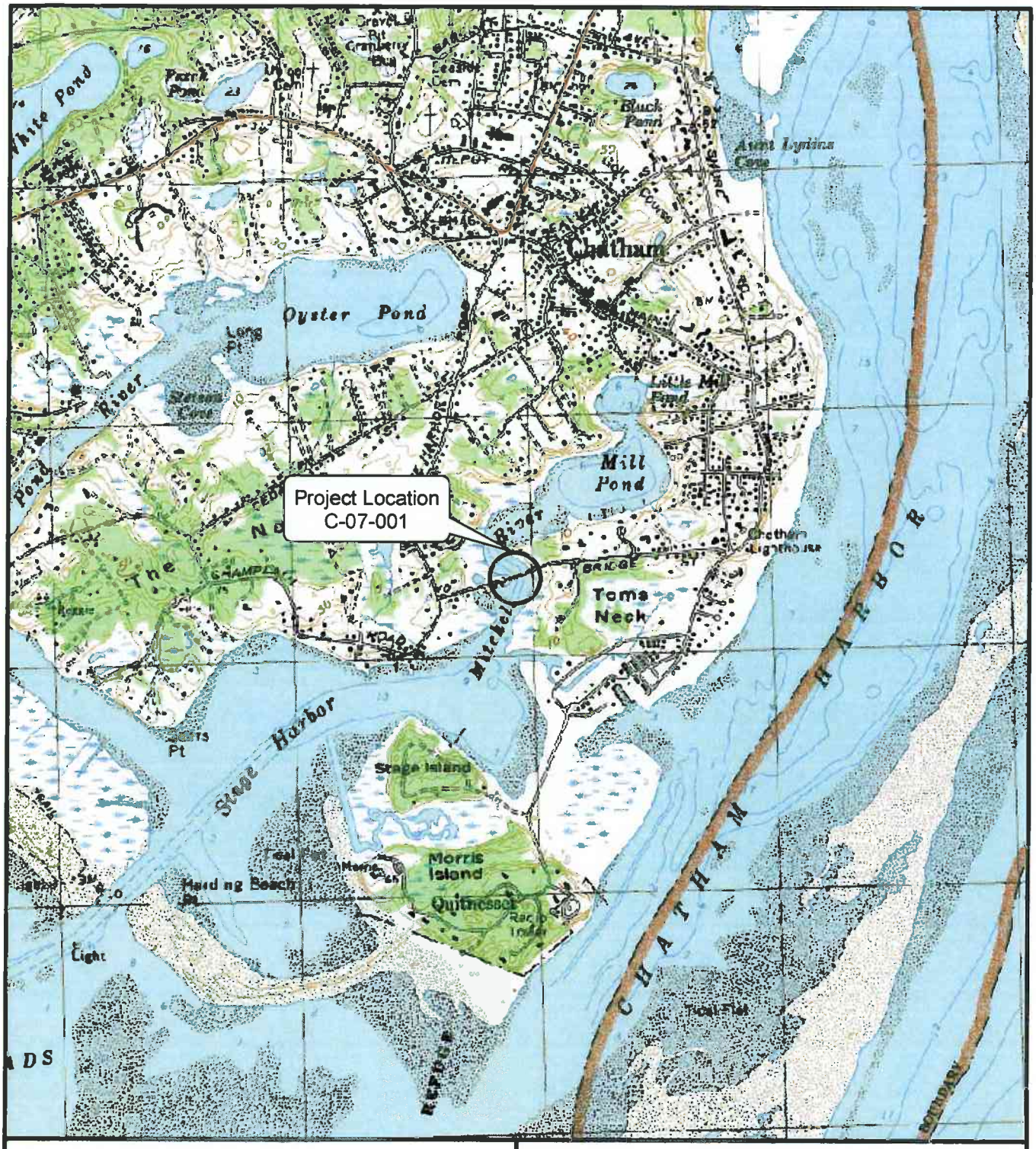
6.17 Blue Shark (*Thunnus thynnus*)

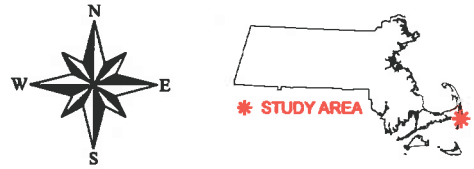
Blue sharks typically inhabit deeper waters and are not likely to be impacted by the project.

7.0 Summary Conclusion

With technical assistance from Saquish Scientific LLC, LEC has reviewed the proposed Mitchell River Bridge reconstruction project in the context of the NOAA Fisheries EFH Designation for Mitchell River Bridge and vicinity in Chatham, Massachusetts. Inspection of the specific water quality parameters and habitat characteristics within the construction area suggest that temporary and permanent impacts to specific EFH may occur. Two alternative bridge designs were evaluated as part of the EFH analysis.

The most likely affected species is winter flounder, as a relatively small area of potentially suitable habitat will be permanently altered by construction activity and all life stages may be impacted by silt-producing construction activity. Temporary and/or direct impacts to other EFH species may occur depending upon actual utilization of the habitat and the timing of proposed activities. These potential impacts are expected to be minor or avoidable depending upon the timing and duration of construction sequences. The Massachusetts DMF recommends that uncontained silt producing activities at the bridge site be avoided between January 15 and May 31 to minimize undesirable effects on winter flounder populations and spawning, and turbidity barriers will be utilized during construction to further reduce potential impacts.. The DMF recommendation has been incorporated into the construction methodology for the project.





0 1,400 2,800 4,200 5,600 Feet

Source: MassGIS

FIGURE 1
SITE LOCATION MAP

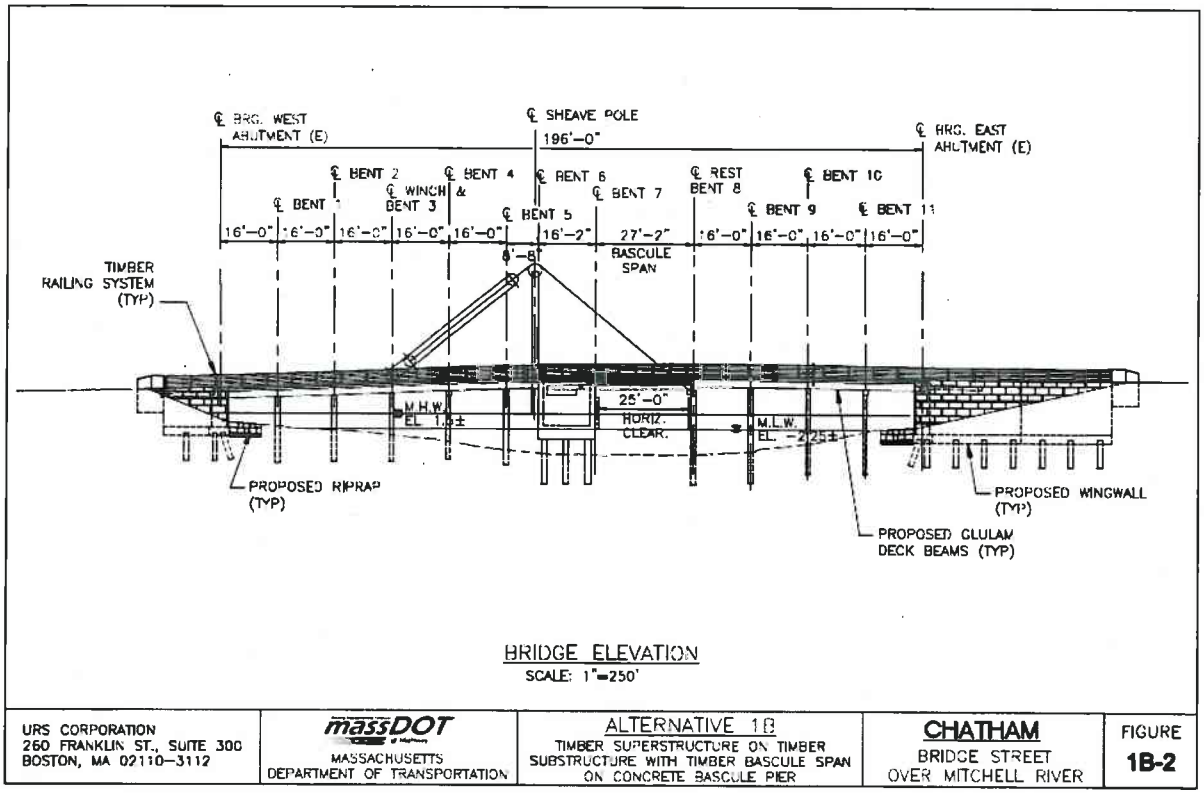
BRIDGE ST BRIDGE C-07-001
CHATHAM, MA

URS
260 FRANKLIN STREET, SUITE 300
BOSTON, MASSACHUSETTS
(617) 542-4244

Project No. 10160737 | **JULY 2009**

J:\National Park Service\Georges Island\CADD\GIS\Georges Island SiteMap.mxd

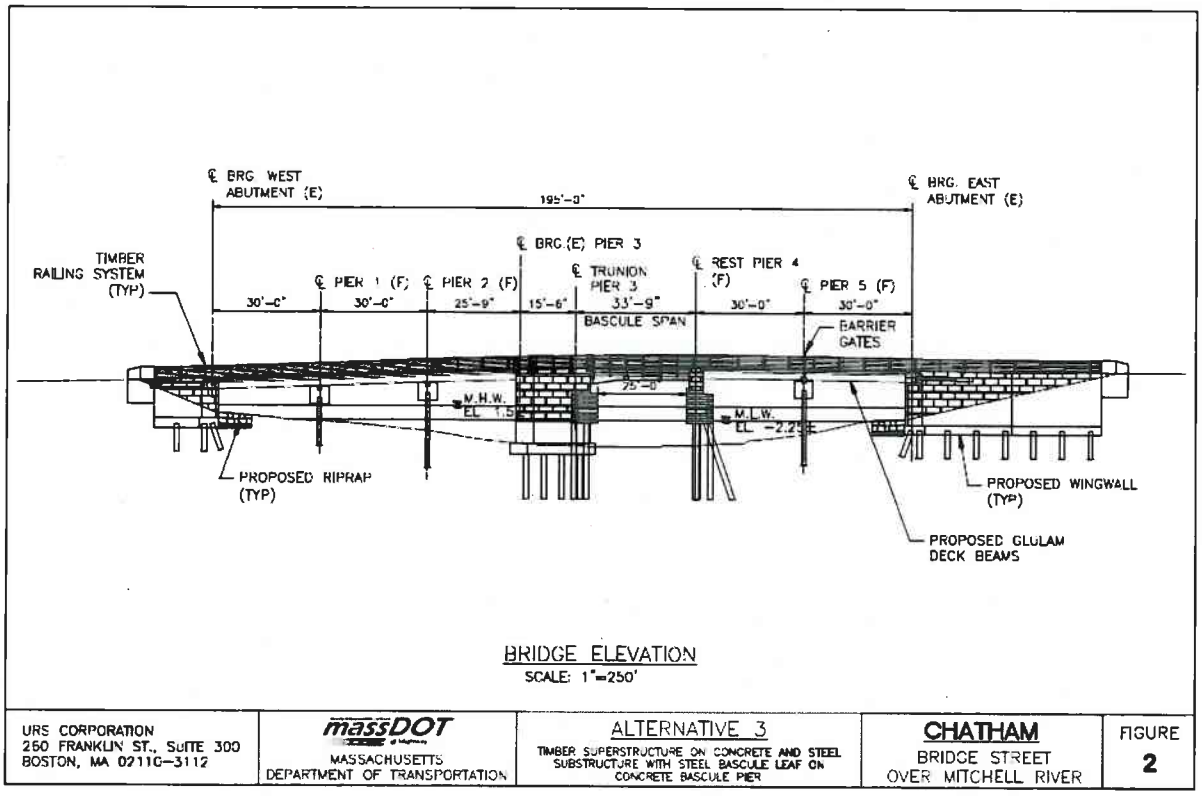
Figure 2: Site plan for Alternative 1B: Timber superstructure on timber substructure with timber bascule span.



BRIDGE ELEVATION
SCALE: 1"=250'

URS CORPORATION 260 FRANKLIN ST., SUITE 300 BOSTON, MA 02110-3112	massDOT MASSACHUSETTS DEPARTMENT OF TRANSPORTATION	ALTERNATIVE 1B TIMBER SUPERSTRUCTURE ON TIMBER SUBSTRUCTURE WITH TIMBER BASCULE SPAN ON CONCRETE BASCULE PIER	CHATHAM BRIDGE STREET OVER MITCHELL RIVER	FIGURE 1B-2

Figure 3: Site plan for Alternative 3: Timber superstructure on concrete and steel substructure.



Figures 4-5: View of the existing Mitchell River bridge upstream (left) and downstream (right).

Figures 6-7: Views of eastern (left) and western (right) shorelines from the north side of the bridge.

Figure 8: Summary of Essential Fish Habitat (EFH) Designation

10◆ x 10◆ Square Coordinates:

Boundary	North	East	South	West
Coordinate	41° 40.0◆ N	69° 50.0◆ W	41° 30.0◆ N	70° 00.0◆ W

Square Description (i.e. habitat, landmarks, coastline markers): Waters within the Atlantic Ocean within the square affecting east of Chatham, MA. This square includes waters affecting the northern part of Monomoy Island.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod *(Gadus morhua)*				X
haddock *(Melanogrammus aeglefinus)*				X
pollock *(Pollachius virens)*				
whiting *(Merluccius bilinearis)*				
offshore hake *(Merluccius albidus)*				
red hake *(Urophycis chuss)*				
white hake *(Urophycis tenuis)*				
redfish *(Sebastes fasciatus)*	n/a			
witch flounder *(Glyptocephalus cynoglossus)*				
winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
yellowtail flounder *(Limanda ferruginea)*				
windowpane flounder *(Scophthalmus aquosus)*				
American plaice *(Hippoglossoides platessoides)*				
ocean pout *(Macrozoarces americanus)*				
Atlantic halibut *(Hippoglossus hippoglossus)*	X	X	X	X
Atlantic sea scallop *(Placopecten magellanicus)*				
Atlantic sea herring *(Clupea harengus)*				
monkfish *(Lophius americanus)*				
bluefish *(Pomatomus saltatrix)*				

long finned squid *(Loligo pealeii)*	n/a	n/a	X	X
short finned squid *(Illex illecebrosus)*	n/a	n/a	X	X
Atlantic butterfish *(Peprilus triacanthus)*	X	X	X	X
Atlantic mackerel *(Scomber scombrus)*	X	X	X	X
summer flounder *(Paralichthys dentatus)*	X	X	X	X
scup *(Stenotomus chrysops)*	n/a	n/a	X	X
black sea bass *(Centropristis striata)*	n/a	X	X	X
surf clam *(Spisula solidissima)*	n/a	n/a	X	X
ocean quahog *(Artica islandica)*	n/a	n/a		
spiny dogfish *(Squalus acanthias)*	n/a	n/a		
tilefish *(Lopholatilus chamaeleonticeps)*				
blue shark (*Prionace glauca)*				X
bluefin tuna *(Thunnus thynnus)*			X	X